

*insert* PROTECTIVE HELMET AND ITS MEANS FOR CONNECTING AN  
ACCESSORY

[0001] The present invention relates to an improvement to a protective helmet, and more particularly its means for connecting an accessory such as a support, for example, for a night-vision device or the like, or even a protective screen.

[0002] Protective helmets are already known, which are used in various fields and worn by various users such as cyclists, motorcyclists, firefighters, skiers and others, such as aircraft or helicopter pilots. All of the currently available helmets, irrespective of their use, include a generally spherical rigid outer shell, having a facial opening, and whose cavity thus formed includes protective and comfort padding elements adapted to nest the user's head. Furthermore, the helmet is conventionally held on the user's head by a flexible chin strap fixed to the lateral portions of the helmet.

[0003] The present invention relates more particularly, but in a non-limiting fashion, to helmets for aircraft or helicopter pilots. Such helmets are equipped with a visualization device, such as a night-vision device. Such a device must be firmly held on the helmet and must have a precise position in relation to the user's eye. The problem of fixing it to the helmet therefore arises.

[0004] Helmets equipped with such devices are already known. For example, the one disclosed by the French Patents 2 560753 and 2 708427, U.S. Patents US 5 265 276 and US 4 449 787, European Patent Application EP 0 671 132. None of the patents discloses an efficient detachable mounting providing reliability and precision while being easily dismounted by the user in order to be replaced by another possible accessory.

[0005] The present invention therefore proposes particularly simple and reliable detachable means for connecting an accessory to the helmet.

[0006] Thus, the protective helmet of the invention including a main outer shell with a generally vertical plane of symmetry on which an accessory, such as a clear or tinted visor or a support structure for optronic equipment such as a night-vision device, can be fixed, is characterized in that it includes connecting and locking means enabling the user to fix one or the other of the accessories to said helmet.

[0007] According to one complementary characteristic, the connecting and locking means are arranged on both sides of the shell and are constituted by a hooking pin affixed to the shell of the helmet and a hooking and locking piece affixed to the accessory.

**[0008]** According to another of the characteristics, each of the pins extends outwardly on both sides of the corresponding lateral wall of the shell along a transverse axis.

**[0009]** According to a preferred embodiment, each of the pins is cylindrical and includes a hooking groove adapted to cooperate with the corresponding hooking piece of the support wall, whereas the hooking and locking piece is constituted by a metallic bar affixed to the accessory of the helmet and includes a pivotally movable lock biased by an elastic system such as a torsional spring.

**[0010]** Moreover, the bar includes a rearwardly open housing, whereas the lock is constituted by a hook-shaped metallic piece journaled on said bar about a pivoting axis, and whereas the lock includes a rear locking projection extending upwardly to form, together with the housing of the bar, a hole that is adapted to cooperate with the corresponding hooking pin of the shell.

**[0011]** According to one complementary characteristic, the lock is pivotally arranged on its corresponding bar so as to be capable of pivoting downward against the action of the spring, and to be biased in upward abutment by this spring.

**[0012]** In a preferred embodiment of the invention, the support structure for a night-vision device is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion, whereas it includes an ocular protective screen pivotally movable about a transverse axis in relation to the shell between two positions, i.e., between an active lowered position of use according to which it is arranged in front of the user's eyes and an inactive raised position of non-use according to which it is raised so as to be in front of the frontal wall of the shell, said screen being guided in the center of the helmet by a guiding and locking carriage moving in a central slide. According to this embodiment, the wall of the support structure is arranged at the level of the front upper wall portion of the shell, beyond and at a certain distance from the latter so as to leave a space enabling the protective screen to move with its guiding carriage, whereas said wall of the support structure includes at least one hole enabling the user to have access to the guiding carriage of the ocular protective screen in order to be able to maneuver it, even in the presence of the night-vision device.

**[0013]** Other characteristics and advantages of the invention will become apparent from the description that follows, with reference to the annexed drawings which are only provided by way of non-limiting examples.

Figure 1 is a lateral view, with a partial tear, showing the helmet according to the

invention with one of its accessories, in particular, its support for a night-vision device.

Figure 2 is a perspective view of the helmet without its accessory.

Figure 3 is a perspective view of the helmet with its support for a night-vision device, said device not being shown.

Figures 4 and 5 are views showing the supports for a night-vision device, with its means for connecting to the helmet.

Figure 4 is a rear perspective view.

Figure 5 is a front perspective view.

Figures 6, 7, and 8 are views showing the connecting means affixed to the accessory.

Figure 6 is an outer lateral view.

Figure 7 is an end view.

Figure 8 is an inner lateral view.

Figures 9, 10, and 11 are views showing the connecting bar without its lock.

Figures 12, 13, and 14 are views showing the corresponding lock.

Figures 15, 16, and 17 show the various steps in fixing the support.

Figure 18 is a rear perspective view showing how the third point for connecting the support to the helmet is obtained, Figure 19 showing the corresponding connecting portion of said support.

Figures 20-22 show the various steps in releasing the support.

Figures 23 and 24 show two types of possible accessories that can be detachably connected to the helmet.

Figure 23 shows an alternative support for a night-vision device.

Figure 24 shows the helmet according to the invention with a detachable facial protective screen.

Figure 25 shows the helmet of the invention with a detachable ocular protective screen.

**[0014]** The protective helmet shown in Figures 1-24, generally designated by the reference numeral (1) is, for example, a helmet for aircraft or helicopter pilots having a generally longitudinal plane of symmetry (P), which includes, in a known fashion, a main outer shell (2) having a front facial opening (3) with an internal padding commonly called the cap.

**[0015]** The main outer shell is constituted by a substantially spherical wall, with a generally vertical plane of symmetry (P), which is advantageously made of a composite

material of the type including a stacking of layers of reinforcing fibers, impregnated and linked to one another by a resin matrix. The fibers can be glass, aramid, Nylon, polyethylene, or carbon fibers, whereas the matrix can be a thermosetting- or thermoplastic-type resin.

**[0016]** The main outer shell (2) includes a plurality of wall portions, namely, a front upper wall portion (6) extended rearwardly by a rear upper wall portion (7) itself extended downwardly by a rear lower wall portion (8), and further includes two lateral wall portions (9a, 9b). The front upper portion (6) corresponds to the zone occupied by the user's forehead and is limited by the upper edge (10) of the facial opening (3) which is limited laterally by two lateral edges (11a, 11b). The rear upper wall portion (7) corresponds to the zone occupied by the user's skull, whereas the rear lower wall portion (8) corresponds to the zone occupied by the user's nape of the neck. Moreover, the wall (5) of the cap is limited downwardly by a lower edge (12). The lateral wall portions (9a, 9b) correspond to the zones occupied by the user's ears and are limited forwardly by the corresponding lateral edge (11a, 11b) of the facial opening (3) and downwardly by the front ends of the lower edge (12). The connection between the lateral edges (11) and the lower edge occurs along an advantageously curved connecting edge (13). The helmet of the invention further includes a chin strap (14) constituted, for example, by a flexible strap.

**[0017]** Furthermore, the inner covering of the shell (2) is constituted by a cap made, for example, of a rigid foam covered with a comfort flexible foam layer and a fabric for the internal decoration of the helmet.

**[0018]** The helmet (1) according to the invention can include an ocular protective screen (5) pivotally movable about a transverse axis XX' in relation to the shell (1) between two positions, i.e., between a lowered active position of use according to which it is positioned in front of the user's eyes and a raised inactive position of non-use according to which it is raised so as to be in front of the frontal wall of the shell. Said screen (5) is guided in the center of the helmet by a guiding and locking carriage (50) moving in a central slide (51).

**[0019]** The helmet (1) according to the invention is adapted to receive an accessory such as, for example, a support structure (8, 8') for a night-vision device (9) or a clear or tinted visor (8''), for example.

**[0020]** According to one characteristic of the invention, the helmet includes connecting and locking means adapted to detachably fix one or the other of the accessories, depending on the user's needs.

[0021] Thus, according to one characteristic of the invention, connecting and locking means are provided between the helmet and the accessory, which enable the accessory to be reliably connected to the helmet while allowing a particularly simple and voluntary detachment.

[0022] The support structure of the night-vision device (8) is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion.

[0023] It is noted that the wall (80) of the support structure (8) is arranged at the level of the front upper wall portion (6) of the shell, beyond and at a certain distance from the latter so as to leave a space (e) enabling the protective screen (6) to move with its guiding carriage (50), as is particularly visible in Figure 1a. Furthermore, said support wall (8) includes at least one hole and advantageously two elongated holes (80, 81) enabling the user to have access to the guiding carriage (50) of the ocular protective screen (6) in order to be able to maneuver it even in the presence of the night-vision device.

[0024] The connecting and locking means are constituted by a hooking pin (15a, 15b) affixed to the shell (2) of the helmet and a hooking and locking piece (16a, 16b) affixed to the accessory (8). Each of the pins (15a, 15b) extends outward on both sides of the corresponding lateral wall (9a, 9b) of the shell and is advantageously arranged coaxially with respect to the transverse pivoting axis XX' of the ocular protective screen (5). In addition, each of the advantageously cylindrical pins (15a, 15b) includes a hooking groove (150a, 150b) adapted to cooperate with the corresponding hooking piece of the support wall.

[0025] Said hooking and locking piece (16a, 16b) is constituted by a metallic bar (17) fixed to the support structure (8, 8'), and includes a housing (18) open rearwardly and a pivotally movable lock (19) biased by an elastic system such as a torsional spring (20).

[0026] The lock (19) is constituted by a hook-shaped metallic piece journaled on the hooking bar about a pivoting axle (21). Said lock therefore includes a rear locking projection (22) extending upwardly to form, together with the housing (18) of the bar (17), a hole (23) adapted to cooperate with the corresponding hooking pin (15a, 15b) of the shell.

[0027] It is noted that the housing (18) of the bar (17) is limited upwardly and downwardly by an upper edge (24) and a lower edge (25), the end of the upper edge (24) including a first chamfer (26). Furthermore, the rear edge (27) of the locking projection (22) includes a second chamfer (28) adapted to form, together with the first chamfer (26) of the bar, a V (30) for engaging the hooking pin (15a, 15b) of the helmet, promoting the snap positioning of the support wall. The lock (19) is pivotally arranged on its corresponding bar

so as to be capable of pivoting downward along (R) against the action of the spring, and to be biased in upward abutment by this spring.

[0028] The support of the night-vision device is such that its triangular wall carries a hooking piece (16a, 16b) at each of its lateral ends (29a, 29b), whereas its central upper end (29) includes hooking means (30) adapted to cooperate with a central upper hooking piece (31) fixed to the wall of the shell of the helmet. Thus, the support wall (8) of the night-vision device (9) is fixed to the helmet at three points (A, B, C) forming a perfect retention triangle.

[0029] Figures 15, 16, 17 show the procedure for fixing the support wall (8). Said procedure begins by bringing the wall support closer to the helmet (Figure 15), then by hooking the hooking means (30) of the upper central end (29) on the upper central hooking piece (31) as shown in Figure 16, and then by snap engaging the hooking pieces (16a, 16b) on the corresponding pins (Figure 17).

[0030] The separation of the support (8) from the helmet (1) is carried out just as easily, as shown in Figures 20, 21, 22. To unlock, the user only has to press forwardly, along F, on each of the movable locks (19) with his two thumbs, as shown in Figure 20. This causes the downward pivoting of each of the locks, on the one hand, and the forward pivoting of the support wall, and results, therefore, in its disengagement from the pins (15a, 15b).

[0031] Of course, the device carried by the support (8) can be of any type other than a night-vision device, such as an assembly of optronic means, binoculars, or the like, for example.

[0032] It is noted that the support (8) previously described and illustrated in Figures 1-22 is constituted by a substantially rectangular spherical wall, but it could be otherwise, as shown in Figure 23, for example. According to this alternative, the support is constituted by a frontal band (8').

[0033] In addition, the detachable accessory can also be a clear or tinted transparent facial protective screen (8'') as shown in Figure 24, without leaving the scope of the invention, said screen being detachable and pivotal about each of the pins (15a, 15b) so as to be movable between two positions, namely, an inactive raised position (I) and a lowered position of use (II). Said detachable facial screen is therefore connected laterally to the hooking pins and in its upper central portion (29) to the guiding carriage (50); of course, the connection to the carriage is also detachable and can be, for example, as that described previously in connection with the embodiments shown in Figures 15-19.

**[0034]** The accessory can also be a detachable ocular screen (5'), as shown in Figure 25, the connection to the helmet being identical to that of the facial screen described in the previous paragraph.

**[0035]** It is understood that due to the connection interface (15a-15b, 16a-16b), it is possible for the user to detachably fix an accessory and to remove it in order to fix another.

**[0036]** Of course, the invention is not limited to the embodiments described and shown by way of examples, but it includes all of the technical equivalents as well as their combinations.